CHAPTER 3
DESIGN

SECTION 301
GENERAL

301.1 Application. Design of off-site construction shall be in accordance with the provisions of the applicable codes and standards adopted by the authority having jurisdiction. The requirements in this standard shall be in addition to the requirements of the applicable codes and standards.

301.2 Alternative materials, design and methods of construction and equipment. The provisions of this standard are not intended to prevent the use of alternate materials and methods permitted by Section 104.11 of the IBC and Section R104.11 of the IRC as permitted by the adopted codes of the AHJ.

301.3 Transportation. Transportation considerations shall be in accordance with Chapter 7.

SECTION 302
MECHANICAL

302.1 Scope. The provisions of this section shall govern the design and installation of mechanical and fuel gas systems for off-site construction.

302.2 Application. Design and installation of mechanical and fuel gas systems shall be in accordance with the provisions of the mechanical and fuel gas codes and standards adopted by the Authority Having Jurisdiction. The requirements in this section shall be in addition to the requirements of the applicable codes and standards.

302.3 Construction Documents. The design documentation shall describe and delineate the portions of the systems that are to be constructed off-site from those that are to be constructed on-site and identify the registered design professional responsible for off-site and on-site MEP system components.

302.4 Equipment Location. Equipment shall be installed in accordance with the equipment manufacturer's instructions.

302.4.1 Equipment installed in unconditioned locations shall be listed and labeled for such applications.

302.4.2 Equipment location shall comply with Section 303 of the IMC.

302.5 Controls and Control Wiring.

302.5.1 Location. Temperature control devices shall be installed in a central location within the habitable space.

302.6 Fire and Smoke Damper Installation.

302.6.1 Access. Access shall be provided for all fire and smoke barrier devices in accordance with the IBC and IMC.

302.6.2 Identification. Smoke and fire dampers shall be permanently identified upon installation at the factory.

302.6.3 Inspection. Smoke and fire dampers shall be inspected at the factory upon installation for compliance with applicable codes, standards and the damper manufacturer's instructions.

302.7 System Connections.

302.7.1 Identification. Where commissioning of systems occurs, mechanical system connections for final on-site connection shall be identified with a permanently affixed marking which indicates purpose and intended function of the pipe or duct. Markings shall have letters with a minimum size of ½ inch (12.7 mm) tall.

302.7.2 Location and Access. Mechanical system connections shall be accessible for connection on site with working space to permit connection methodology and necessary clearances for combustible construction. Stub-out of piping shall provide access for brazing and connection of fittings.

302.7.3 Protection of Connections. Mechanical system connections shall be protected from damage, shearing or compression.

302.7.4 Preparation for In-Transit Closure of System Components. System connections shall be sealed in accordance with Section 402 of this standard. Piping systems shall be drawn into a vacuum or according to the OEM instructions for the duration of storage and transportation to the on-site location.

SECTION 303
ELECTRICAL

303.1 Scope. The provisions of this section shall govern electrical wiring systems compliance in the design, assembly, installation, equipment, alternative materials and other details of assemblies manufactured in off-site construction that are not otherwise listed products.

303.2 Application. Design and installation of electrical systems shall be in accordance with the provisions of the electrical codes and standards adopted by the authority having jurisdiction. The requirements in this section shall be in addition to the requirements of the applicable codes and standards.

303.3 Construction Documents. The design documentation shall describe and delineate the portions of the systems that are to be constructed off-site from those that are to be constructed on-site and identify the registered design professional responsible for off-site and on-site elements.

303.4 Design. Electrical system design shall comply with the applicable provisions of NFPA 70, or other electrical codes as adopted by the jurisdiction.

303.4.1 Manufactured Buildings. Electrical systems for manufactured buildings, building components, relocatable

structures shall be designed in accordance with Article 545 of NFPA 70.

303.4.2 Emergency Systems. Emergency systems shall be designed in accordance with the applicable requirements in the IFC, IBC, Article 700 of NFPA 70 and the applicable provisions of NFPA 110 and NFPA 111.

303.4.3 Legally Required Systems. Legally required systems shall be designed in accordance with Article 701 of NFPA 70 and the applicable provisions of NFPA 110 and NFPA 111.

303.4.4 Optional Standby Systems. Optional standby systems shall be designed in accordance with Article 702 of NFPA 70.

303.4.5 Energy Storage Systems. Energy storage systems shall be designed in accordance with the appliable provisions of the IFC or IRC.

303.4.6 Solar Photovoltaic Systems. Solar photovoltaic systems shall be designed in accordance with the applicable provisions of NFPA 70 and the IFC or IRC.

303.4.6.1 Listing. Solar photovoltaic systems shall be listed and labeled in accordance with the following standards:

1. Photovoltaic modules: UL 1703, or with both UL 61730-1 Photovoltaic (PV) Module Safety Qualification - Part 1: Requirements For Construction, and 61730-2 Photovoltaic (PV) Module Safety Qualification - Part 2: Requirements For Testing.
2. Building Integrated Photovoltaic Systems: UL 7103.
3. Inverters: UL 1741.
4. Rapid Shutdown Devices and Systems: UL 1741.

303.4.7 Modular Data Centers. Modular data centers shall be designed in accordance with Article 646 of NFPA 70.

303.4.7.1 Listing. Modular data centers shall be listed and labeled in accordance with UL 2755 and comply with Articles 646.3(N) and 646.5 through 646.9 of NFPA 70 or comply with Article 646 of NFPA 70.

303.4.8 Health Care Facilities. Modular buildings, modular components and modules intended for use in health care facilities shall be designed in accordance with Article 517 of NFPA 70 and NFPA 99 Health Care Facilities Code.

SECTION 304
PLUMBING

304.1 Scope. The provisions of this section shall govern the design and installation of plumbing systems for off-site construction.

304.2 Application. Design and installation of plumbing systems shall be in accordance with the provisions of the plumbing codes and standards adopted by the authority having jurisdiction. The requirements in this section shall be in addition to the requirements of the applicable codes and standards.

304.3 Construction Documents. The design documentation shall describe and delineate the portions of the systems that are to be constructed off-site from those that are to be constructed on-site. Identify methods of interconnections between on-site and off-site parts, methods of testing and commissioning of the completed system and the approved inspectors responsible for off-site and on-site testing of the plumbing system.

304.4 System Connections. System connections shall be in accordance with Sections 304.4.1 through 304.4.3.

304.4.1 Identification. Where commissioning of systems occurs, plumbing system connections for final on-site connection shall be identified with a permanently affixed marking which indicates purpose and intended function of the pipe or duct. Markings shall have letters with a minimum size of ½ inch (12.7 mm) tall.

304.4.2 Location and Access. Plumbing system connections shall be accessible for connection on site with working space to permit connection. Minimum stub-out of all piping shall be 8 inches (203.2 mm) into the exterior, below the bottom of the floor joist, above the insulation line or vapor barrier or above the roof line.

304.4.3 Protection of Connections. Plumbing system connections shall be protected from damage, shearing or compression.

304.4.4 Preparation for In-Transit Closure of System Components. System connections shall be sealed in accordance with Section 404 of this standard.

SECTION 305
(Reserved)

SECTION 306
ENERGY CONSERVATION

306.1 Scope. The provisions of this section shall govern the design and installation of energy efficient systems for off-site construction.

306.2 Application. Design and installation of MEP elements for energy efficiency shall be in accordance with the provisions of the energy conservations codes and standards adopted by the Authority Having Jurisdiction. The requirements in this section shall be in addition to the requirements of the applicable codes and standards.

306.3 Exterior walls. Exterior walls shall comply with performance requirements in IBC Chapter 14 for weather protection, structural load resistance, fire resistance, water resistance and flood resistance, where applicable, and IECC Section C402 or IRC Chapter 6 and Sections R703 and N1102 (R402) for building thermal envelope.

306.3.1 Control layers. Where applicable, air, vapor and weather barrier systems and flashing shall be designed and installed to provide continuous barriers.

306.3.2 Continuity of exterior insulation. Exterior insulation systems shall be designed and installed to be continuous.

306.4 Tapered Roof Insulation. The tapered roof insulation calculation that uses the average thickness of sloped roof insulation shall be an average across the full building roof area, and not the average calculated separately for each individual module.